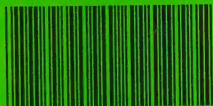


MP MASTER



MA26448



INSTRUCTIONS 11-C-63-5

BACHARACH
ELECTRONIC
GAS LEAK DETECTOR
Model SA63

(U.S. Patent No. 3029628)



BACHARACH INSTRUMENT COMPANY

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OVERHAUL AND WARRANTY SERVICE REPAIR

Model SA63 Leak Detectors returned to factory for repair, whether in warranty or not, must be accompanied by brief description of the faulty operation encountered.

Package Leak Detector carefully, using original packing material if possible, and return prepaid to Bacharach Industrial Instrument Company. ALWAYS REMOVE BATTERIES FROM CHASSIS TO PREVENT SEPARATION AND BATTERY CLIP DAMAGE DURING SHIPMENT.

WARRANTY

Bacharach Instrument Company warrants every new SA63 Leak Detector to be free of defects in workmanship or material and guarantees to repair or replace, at its option, any part or parts that are delivered intact to us with transportation charges prepaid and which prove upon examination by our qualified personnel to be defective.

The terms of warranty shall be applicable for one year from date of purchase by the original user except for items which become expendable with normal use or have a limited "shelf life", as indicated below.

Our liability, whether expressed or implied, shall not be construed as covering any contingent expenses of any other nature. Removal and replacement costs are excluded from our warranty coverage. Our products are designed and manufactured to perform correctly under specified conditions and any variation of these conditions or alteration to the construction of the product without our expressed written consent shall void this warranty. Abuse or misuse shall be deemed a violation of this warranty.

Expressly excluded from the standard warranty policy are the following expendable items and conditions: batteries, lamp bulbs, Filters, Ceramic Saturator Tubes, and damage to SA63 due to leaking batteries.

SPECIFICATIONS AND INSTRUCTIONS
BACHARACH MODEL SA63
(U.S. Patent No. 3029628)
ELECTRONIC GAS LEAK DETECTOR

INTRODUCTION

SPECIFICATIONS

PRINCIPLE OF OPERATION: Thermal Conductivity.

POWER: 6 D size, alkaline manganese batteries (1.5V. each).

RECOMMENDED: EVEREADY ENERGIZER CELL E-95.

BATTERY LIFE: One set of batteries will be good for many hours of continuous operation at maximum sensitivity (maximum current draw). There is no limitation on type of operation (intermittent or continuous). Longer life is to be expected with intermittent operation since some battery recovery will result.

ELECTRONICS: Transistorized etched circuit board.

SENSITIVITY: Maximum sensitivity is .5 ounces per year in terms of Refrigerant 12. For sensi-

tivity to other gases and vapors in pressurized systems; consult TABLE 1.

AMBIENT BACKGROUND: Effect of ambient background caused by source of leak is almost completely eliminated by automatic or manual nulling out of Leak Detector signal, depending on whether background is constant or changing in concentration.

FLOW RATE: Constant speed diaphragm SAMPLING PUMP is factory adjusted at 50cc/min.

RESPONSE TIME: 3 seconds with standard 48 inch long Sampling Tubing and Probe Assembly.

THERMAL CONDUCTIVITY CELL FILAMENT

LIFE: The four Thermal Conductivity Cell Filaments should not need replacement except where Leak Detector has been exposed to undue abuse. Only loss of sensitivity in normal use will be caused by need for battery replacement.

USE IN EXPLOSIVE ATMOSPHERES: Consult factory Service Engineering Department for specific information if use in such atmospheres is contemplated.

LEAK SIZE: Sensitivity Selector Switch enables

operator to distinguish between slight, medium, and large leaks without the aid of simulated leak equipment.

SIZE: 7 3/4" x 3 1/8" x 9 3/4".

WEIGHT: 7 1/2 LBS.

PRINCIPLES OF OPERATION

Model SA63 Leak Detector main components are represented schematically in Figure 1. The battery operated Sampling Pump draws ambient air and leakage gas to be detected into the Probe

Assembly and through a Thermal Conductivity Cell which contains four sensitive Filaments. The Filaments are electrically wired to form a Bridge Circuit, while the gas sample flow "loop" between

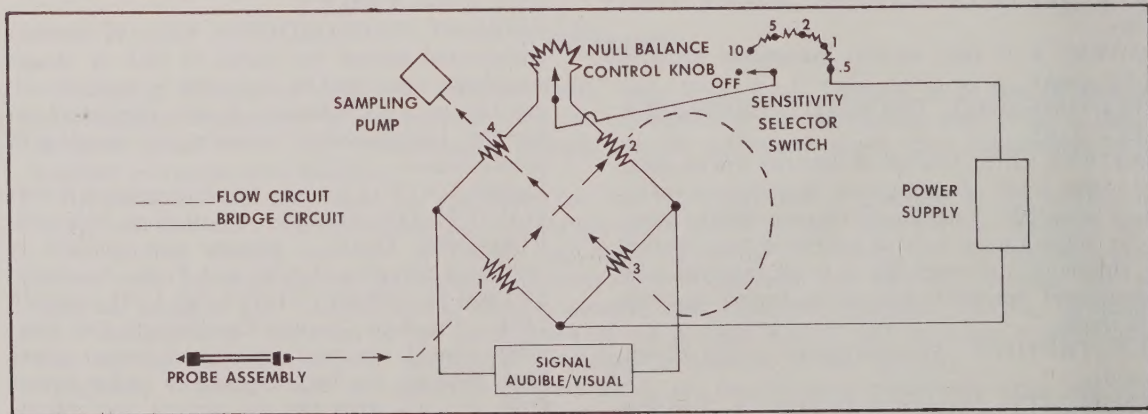


Fig. 1 Gas Leak Detector Flow Circuit and Bridge Circuit Schematic

Filaments 2 and 3 has been designed to give a slight time delay between two sides of the Bridge.

The thermal conductivity Filaments represented as fixed resistances in Figure 1, operate at constant temperature when the Leak Detector is null balanced ("zeroed") on ambient background. Since most gases and vapors, with the exception of hydrogen, helium, and methane, have a thermal conductivity value less than air at Filament operating temperature; the introduction of trace gases such as halogenated hydrocarbons (R11, R12, R22, R113, etc.) will cause an increase in Filament Temperature. The Filament is unable to dissipate heat while surrounded with leaking refrigerant gas

as well as when surrounded by ambient air.

As Filament temperature rises, it's increased electrical resistance combines to unbalance the Bridge, first in one direction then the other. This electrical unbalance produces both an audible and visual signal.

Gases with positive thermal conductivities such as helium, hydrogen, and methane cool the Filament. This likewise produces an output from the Bridge since the magnitude of the electrical resistance of the four Filaments is changed. Leak rate sensitivity of Model SA63 Leak Detector to a wide range of gases and vapors from pressurized systems may be obtained by consulting Table 1.

LEAK DETECTOR SENSITIVITY TO VARIOUS SELECTED GASES AND VAPORS

Maximum sensitivity has been established for Model SA63 Leak Detector as .5 ounces per year (.1 cu. ft. per yr.) leak rate in terms of Refrigerant-12 at 70° F and one atmosphere with Probe held at leak source. Detection by thermal conductivity can be applied to many gases and vapors leaking from pressurized systems. As a rough estimate, the sensitivity of the Leak Detector increases as the difference in thermal conductivity value ($K = B.T.U./hr. sq. ft. ° F/ft.$) between air and the gas or vapor in question increases, but is not

exactly proportional to this difference.

Precise predictions of maximum sensitivity in terms of leak rate of a specific gas are impossible without actual tests conducted on simulated leaks since rate of gas diffusion and viscosity of the gas offset accurate predictions.

Leak rate sensitivity values tabulated in TABLE 1 have been established on simulated leaks and reflect sensitivity to be expected with a given instrument within $\pm 25\%$.

GAS OR VAPOR	REFRIGERATION TRADE UNITS STD. OZ./YR.	INDUSTRIAL NOMENCLATURE	
		U.S.A. STD. CU. FT./YR.	METRIC STD. CC./SEC.
Hydrogen	----	.049	4.4×10^{-5}
Helium	----	.076	6.8×10^{-5}
Refrigerant - 12	0.5	.1	9.0×10^{-5}
Refrigerant - C 318	0.83	.1	9.0×10^{-5}
Refrigerant - 22	0.4	.11	9.8×10^{-5}
Refrigerant - 116	0.63	.11	9.8×10^{-5}
Sulfur Dioxide	----	.12	1.1×10^{-4}
Refrigerant - 14	0.76	.21	1.9×10^{-4}
Butadiene	----	.25	2.2×10^{-4}
Vinyl Chloride	----	.25	2.3×10^{-4}
Refrigerant - 13	1.14	.26	2.4×10^{-4}
Sulfur Hexafluoride	----	.29	2.6×10^{-4}
Methyl Chloride	----	.32	2.9×10^{-4}
Propane	----	.48	4.3×10^{-4}
Argon	----	.5	4.5×10^{-4}
Methane	----	.53	4.8×10^{-4}
Carbon Dioxide	----	.53	4.8×10^{-4}
Nitrous Oxide	----	.59	5.3×10^{-4}
Anhydrous Ammonia	----	1.02	9.2×10^{-4}

TABLE 1: SA63 MAXIMUM SENSITIVITY GUIDE. LEAK RATES MEASURED AT
.5 OZ./YR. SETTING WITH RESPECT TO CLEAN AIR.

OPERATING INSTRUCTIONS

BEFORE OPERATING

1. When leak testing piping or vessels outdoors in rain or where surface condensate is present (refrigeration evaporator coils), replace metal Probe Insert (Code 23-0089) visible in Probe Assembly with wetted Ceramic Saturator Tube (Code 23-0032). Wetting Ceramic Saturator Tube compensates for any free moisture vapor picked up by the Probe. Complete wetting procedure is shown in MAINTENANCE INSTRUCTIONS, Pages 19, 20 & 21.
2. If Leak Detector is already at ambient temperature prevailing in location where use is intended, a warmup period of 5 minutes with Selector Switch set at 0.5 OZ./YR. is sufficient. Longer warmup periods (10-15 minutes) are required when Leak Detector is transported from a colder or warmer

TO OPERATE

1. Lift Leak Detector Lid and swing to one side. Place Probe on surface adjacent to instrument away from operator's exhaled breath.
2. Turn Sensitivity Selector Switch to either 1 or .5 OZ./YR. R - 12 setting.
3. Rotate Null Balance Control to approximately 25, and allow instrument to warmup according to

location for use in 70° F ambients.

3. Warmup and null balancing of Leak Detector should always be conducted in immediate area of equipment to be leak tested, thus instrument will be null balanced on leak gas background present.

4. Leak Detector should not be subjected to vibration from surrounding equipment when in use. Instrument may be used in any position if initially null balanced for that condition.

5. **WARNING:** Do not change COARSE NULL setting unless conditions warrant. Refer to TABLE 2, CHECKLIST, and MAINTENANCE INSTRUCTIONS on Coarse Null Adjustment (Page 22).

schedule suggested in preceding section (BEFORE OPERATING). Audible Signal Switch may be turned OFF during warmup, but should be ON when instrument is null balanced.

4. With Sensitivity Selector Switch still set at 1 or .5 OZ./YR., rotate Null Balance Control slowly in either direction until Visual Signal Lamp is ex-

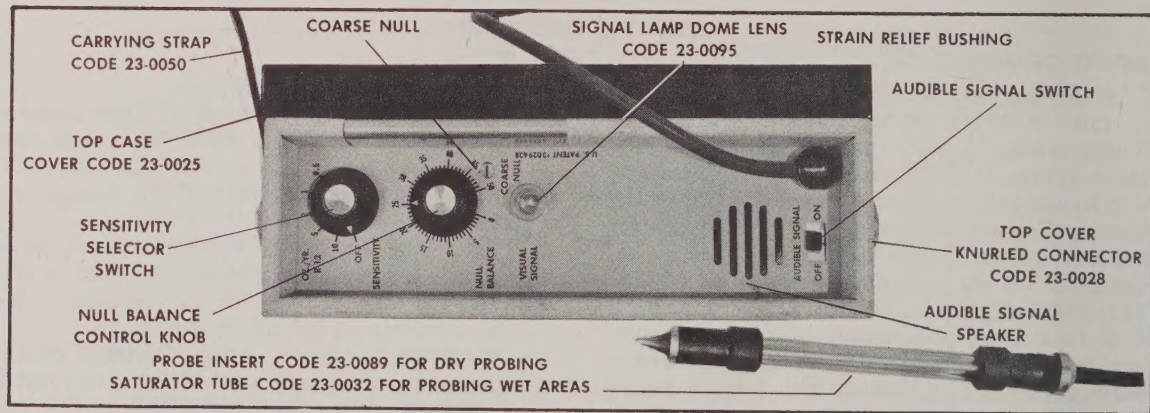


Fig. 2 Control Console Grouping

tinguished and Audible Signal ceases. From this position, turn slowly in one direction until audible and visual signal is obtained (Fig. 3A). Note Null Balance Control scale reading.

5. Now turn Null Balance Control slowly in opposite direction. Audible and visual signal will cease. Continue to rotate Null Balance Control until signal is emitted and note Null Balance Control scale reading again (Fig. 3B).

6. Mentally average the two Scale readings obtained (Fig. 3A and 3B), and set the Null Bal-

ance Control to the average (Fig. 3C).

7. LEAK DETECTOR IS NOW "BALANCED" OR IN A NULL CONDITION, AND WILL REMAIN SO FOR REASONABLE PERIODS OF TIME EVEN WHEN CHANGING SENSITIVITY SETTING. WHEN OPERATING, KEEP PROBE TIP AT LEAST 16 INCHES FROM BREATHING ZONE SINCE SIGNAL CAN BE GENERATED BY CARBON DIOXIDE AND MOISTURE IN EXHALED BREATH.

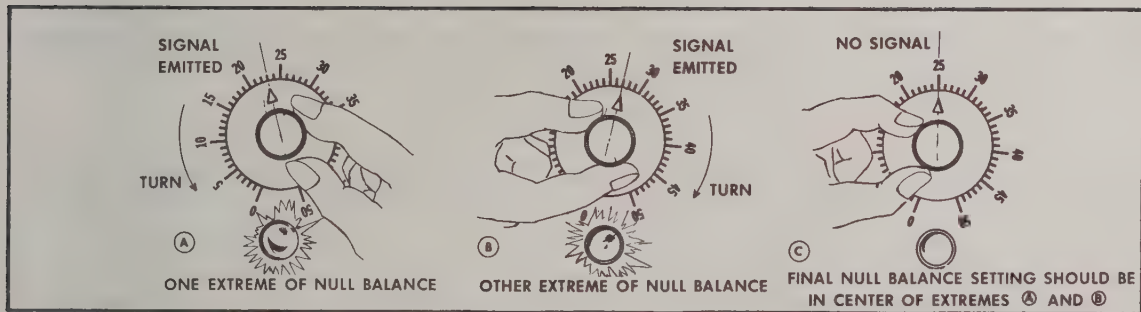


Fig. 3 Null Balancing Model SA63 Gas Leak Detector

EXPLANATION OF NULL BALANCE SETTING (FIG. 3)

Null Balance Control scale settings of 0 through 50 are relative, and merely assist operator in establishing the initial null balance point. Null balance setting as received from factory should be somewhere between 20 and 30 and at least 1½-2 divisions wide (signal to signal).

Since battery voltage, temperature of Leak Detector, and inadequate warmup will influence the position and width of the null balance setting, customer is advised not to be alarmed if balance point is not somewhere between extremes cited.

Effect of low battery voltage will be to move resulting null balance point clockwise towards

50 or counterclockwise towards 0 with the result that null balance extremes will be reduced. This reduction will be most noticeable at the .5 OZ./YR. Selector Switch position. When instrument can no longer be nulled or is difficult to null; replace batteries as described in TABLE 2, CHECKLIST, Test 4.

Effect of instrument temperature extremes will likewise change the null point both with respect to scale position and width (signal to signal). Best Leak Detector performance is obtained between 32° F and 110° F ambient temperature. If extended Leak Detector use is required near either

TABLE 2, MODEL SA63 TROUBLESHOOTER'S CHECKLIST. PRELIMINARY: Perform checklist tests with chassis removed from instrument housing

MALFUNCTION	CHECKLIST TEST	CAUSE OF MALFUNCTION
1. No audible or visual signal.	When Null Balance Control Knob is rotated clockwise through full range from 0 to 50.	Open circuit. Power supply is highly suspect.
2. No Sampling Pump "hum."	Turn Audible Signal Switch to "off" for this test.	Voltage of Sampling Pump and Bridge Circuit Batteries low or making poor contact.
3. No visual signal.	When Null Balance Control Knob is rotated clockwise through full range from 0 to 50.	If Audible Signal sounds (switch on), but Visual Signal Lamp stays off; lamp is defective.
4. Cannot Null Balance. (Audible and visual signal continuous)	When Null Balance Control Knob is rotated slowly clockwise from 0-50, and counter clockwise from 50 to 0. Ignore momentary interruption of signal at extreme of Control Knob travel (0 and 50) resulting from rotating Null Balance Control too quickly.	Sampling Pump and Bridge Circuit Batteries require replacement, or adjustment of Coarse Null Potentiometer is necessary.
5. Signal response excessive or no response at all.	When exhaled breath puffed into Probe Tip, Leak Detector should respond in 3 seconds and in no longer than 5 seconds. Null Leak Detector before performing this CHECKLIST TEST.	Restriction in sampling system. Sampling flow rate low.
6. Signal response still excessive, or no response at all.	When Probe Tip covered with finger - Audible and Visual Signal should occur immediately.	Leak in flow system.

* Important Battery Recommendations And Replacement Procedures Are Fully Described In The MAINTENANCE INSTRUCTIONS.

and selector switch set 0.5 oz./yr. Allow 10 minute warmup period before proceeding. Turn audible signal switch on or off as required.

FIELD REMEDY

Inspect Batteries	1. For leakage – if Batteries leak; replace.* Always clean Battery Clip Terminals with emery cloth after replacing leaking Batteries. 2. Be certain Batteries are making good contact both with themselves and with Terminal Clips. 3. Inspect for other obvious sources of broken circuit such as Battery Terminal Leads, Selector Switch Leads, etc. Perform remainder of CHECKLIST. If Audible and Visual Signal still cannot be obtained; return Leak Detector to factory for repair.
Inspect Batteries Replace Batteries *	1. Inspect as described in Field Remedy 1, 2 and 3 above. 2. If no Battery leakage or evidence of poor contact is found; replace Batteries. Determine whether Pump is operating by measuring flow, and adjusting if necessary. See malfunction No. 5.
Replace Signal Lamp	Spare Signal Lamp is clipped to underside of Chassis. Lamp is commercial type # 49 (Code 23-0102). No substitutes are possible.
Replace Batteries *	Battery types recommended and installation instructions are found in MAINTENANCE INSTRUCTIONS, under Battery Recommendations and Battery Replacement.
Adjust Coarse Null	If after installation of fresh Batteries, Leak Detector still cannot be null balanced or if Null Balance Point is narrow and does not fall between 20 and 30; readjust Coarse Null Potentiometer. See MAINTENANCE INSTRUCTIONS: Adjusting Coarse Null.
Dirt in Probe Tip	Disconnect Probe Tip and clean with wire.
Clogged Filter	Replace Filter from package (Code 23-0070) enclosed in Battery Compartment.
Water in sampling tubing.	Disconnect Hose Nipple Assy. from Probe End Cap and remove Filter. If Filter wet, disconnect Teflon Sampling Tubing from Thermal Conductivity Cell. Blow out Teflon Sampling Tubing until restriction is removed. See MAINTENANCE INSTRUCTIONS for details.
Adjust Flow Screw	Turn Flow Screw out (counter clockwise) to increase flow to correct value (50cc/min.). Signal response from breath should now be 3 seconds. See MAINTENANCE INSTRUCTIONS. If signal response time is still excessive, check for flow system leaks.
Locate Leak or Disconnection	Inspect Probe and Sampling system for loose connections. Examine Thermal Conductivity Cell and Sampling Pump Connections. Perform all tests in MAINTENANCE INSTRUCTIONS under Flow System Leakage. If signal response is still excessive after test 5, test 6, and replacement of Batteries; return Leak Detector to factory for repair.

temperature extreme, the null point may be shifted for better performance by adjusting the Coarse Null Potentiometer (see Page 22) if the instrument is first allowed to come to full temperature equilibrium with the new environment.

ESTABLISHING NULL BALANCE

It is important when establishing the null point (Steps 4, 5, and 6: TO OPERATE), to "hunt" slowly or null position may be passed without operator observing it. Figure 3 shows the angle between extremes of the null balance point. Care should be exercised to establish the null point as close to center of the two extremes as possible (Fig. 3C). For example, if audible and visual signal is emitted when approaching Null Balance Control setting of 23 counterclockwise and 27 clockwise; null setting should be 25.

During leak probing, readjustment of Null Balance Control will be required periodically to compensate for decreasing battery voltage, and possible background caused by relatively large leaks in the system to be checked. Refer to **BACKGROUND PROBING TECHNIQUE**, page 16.

1. Commence leak testing by moving Probe Tip around or along potential leak sources such as

The angle formed by extremes of null balance will be smallest at maximum sensitivity (.5 OZ./YR.), and largest at minimum sensitivity (10 OZ./YR). Therefore, initial null balance should always be established at 1 or .5 OZ./YR. R-12 Sensitivity setting.

CHECKLIST FOR PROPER OPERATION (TABLE 2)

It is good practice to check for proper functioning by performing the **TROUBLESHOOTER'S CHECKLIST** in TABLE 2 before taking Leak Detector into field for extended periods. Use of the **CHECKLIST** also fulfills user's obligation to perform routine maintenance before requesting factory to perform in-warranty repair service. **TROUBLESHOOTER'S CHECKLIST** should be followed in order given.

TO LEAK PROBE

threaded, flanged, soldered, or welded connections, fittings gaskets, etc. A **PROBING RATE OF 3/4 TO 1 INCH PER SECOND SHOULD BE USED TAKING CARE TO KEEP PROBE TIP AS CLOSE TO LEAK SOURCE AS POSSIBLE WITHOUT CLOSING OFF END.** If probe tip end is sealed momentarily, a false signal will be produced.

2. WHEN AUDIBLE AND VISUAL SIGNALS INDICATE A LEAK, REMOVE PROBE FROM VICINITY OF LEAK AS SOON AS SIGNAL IS NOTED. In case of a large leak, signal may persist for 5 or 10 seconds after Probe is withdrawn from leak. A second signal of shorter duration may then appear. SIGNAL, BOTH AUDIBLE AND VISUAL, SHOULD THEN CEASE. This indicates a leak. If, however, signal persists

when Probe is removed from vicinity of suspected leak and it becomes necessary to readjust Null Balance Control, then leak signal noted is a false signal caused by simple Bridge unbalance.

3. IN ORDER TO PINPOINT THE SUSPECTED LEAK; PROBE BACKWARDS FROM POINT SIGNAL FIRST OCCURED AT A SLOWER RATE OF ABOUT 1/4 INCH PER SECOND.

TYPES OF LEAK SIGNALS OBTAINED

Generally, a leak signal will consist of a double audible and visual signal, but in some cases only a single signal will be heard due to diffusion ("feathering") of the leading and trailing edge of the leakage gas in the Flow System.

EITHER SINGLE OR DOUBLE SIGNAL INDICATES A LEAK IF WHEN PROBE IS REMOVED FROM LEAK SOURCE, THE LEAK DETECTOR RENULLS AUTOMATICALLY. The longer the Probe is held at the leak, the longer will be the time required for the Flow System to purge and the instrument to return to a no signal, balanced condition. A heavy leak will also result in longer signal persistence.

Three different types of leak signals may be obtained:

- A. A double signal, both of short duration, due to a medium leak or a high probing rate (Fig. 4).
- B. A double signal, both of longer duration due to a heavy leak (Fig. 5).
- C. A single signal which occurs after probing slightly past a small leak. No second signal is triggered after the Probe is removed from leak source (Fig. 6).

Figures 4 through 6 illustrate leak signals obtained under conditions outlined in A, B, and C. For clarity, the electrical circuit has been omitted, and the flow circuit, though simplified is equivalent to the existing one. The signal output is represented as a galvanometer to illustrate the electrical magnitude and direction of the signal produced as leakage gas passes over all four detector Filaments.

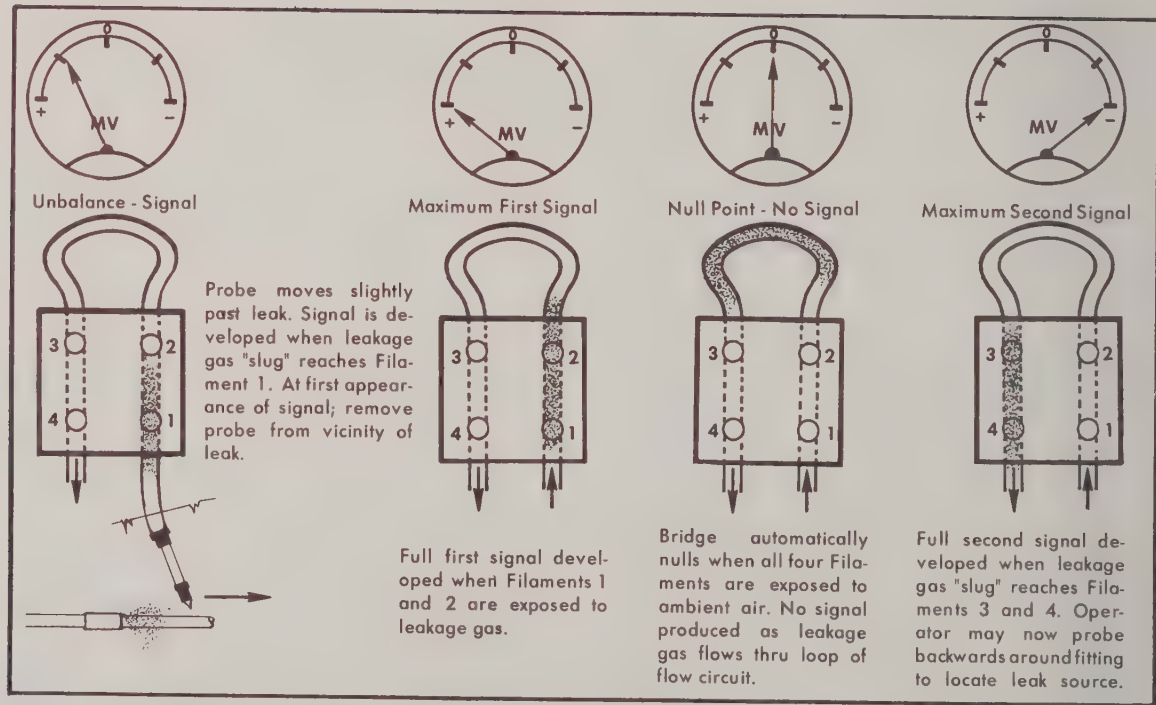


Fig. 4 Case A; Double Signal of Short Duration Caused by Medium Leak and/or Fast Probing of Leak Area

In practice, however, signal intensity will be constant, although operator will notice a variation in signal duration due to size of leak and rate probe is moved.

WHEN REFERRING TO FIGURES 4 THROUGH 6, ASSUME THE BRIDGE CIRCUIT HAS BEEN BALANCED WITH THE NULL BALANCE CONTROL ON AMBIENT AIR PRIOR TO PROBING. Ambient air is represented as white while gray shading is leakage gas entrained in the Flow Circuit as the Probe is passed over a leak. Ambient air may be defined for purposes of these Instructions as the background gaseous composition surrounding the equipment to be leak tested. In many applications this air will be contaminated by leaking gas from the

equipment.

The illustrations should enable the Leak Detector operator to visualize how contaminated ambient background effects are nulled out of the instrument when balancing with the Null Balance Control prior to leak probing. All four Filaments are exposed to the same contaminated ambient background, thus canceling out undesirable false signals. If ambient background contamination is fairly constant, Bridge unbalance (signal emitted) will not occur until leak is located, assuming instrument is fully warmed up. If ambient background contamination is not constant, it may be necessary to rebalance the Leak Detector manually several times with the Null Balance Control before continuing to probe for leaks (See LEAK GAS BACKGROUND PROBING TECHNIQUE).

ESTIMATING SIZE OF LEAK

The Sensitivity Selector Switch may be used to differentiate between slight, medium, or large leaks if the need arises.

For example, if a Refrigerant 12 leak has been located at a Sensitivity setting of 1 OZ./YR.; operator knows the leak rate is at least 1 ounce per year or greater. Switching to a higher Sensitivity setting enables classifying leak as "1 ounce

per year or less" if no signal is produced at a setting of 2 OZ./YR.

When probing at a rate of $\frac{1}{4}$ inch per second, Refrigerant 12 Sensitivity settings marked on Control Console are valid within $\pm 25\%$. These are intended to permit evaluation of leak rate in the field without use of leak standards, and as such must be considered approximations.

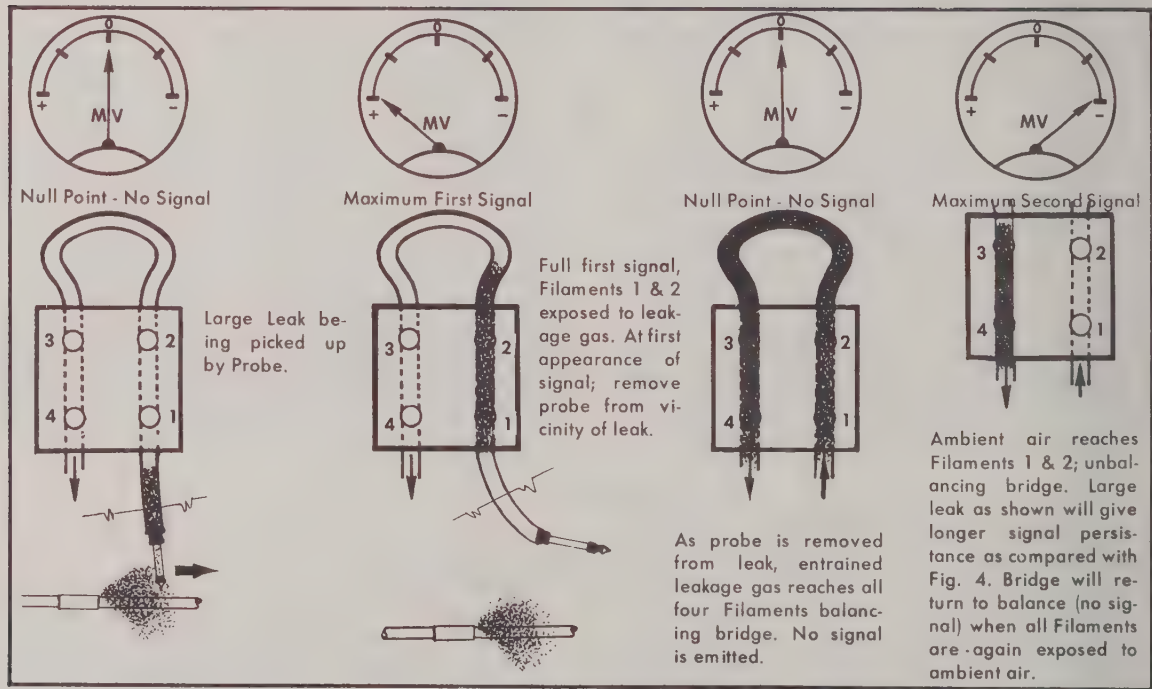


Fig. 5 Case B; Double Signal of Longer Duration Caused by Large Leak

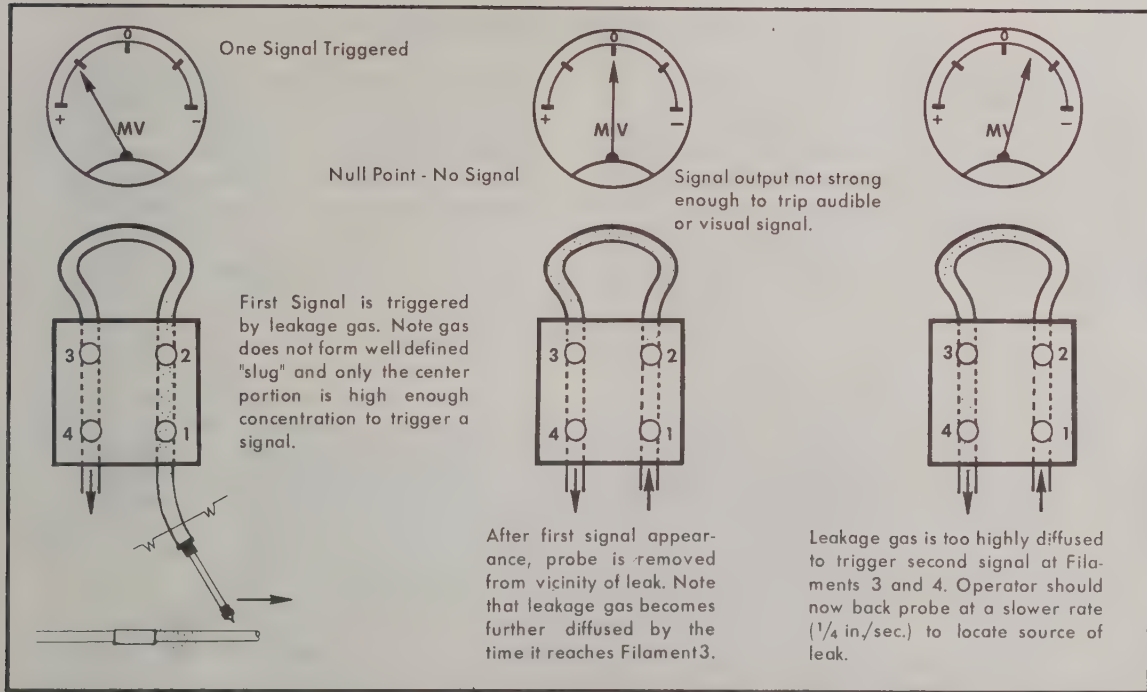


Fig. 6 Case C; Single Caused by Slight Leak

LEAK GAS BACKGROUND PROBING TECHNIQUE

Leak Detector should always be adjusted and null balanced near the equipment to be leak tested. Ambient air containing a fairly constant background concentration of leaking gas will require very little Null Balance Control readjustment.

Variable background contamination will require some readjustment of null balance when leak probing, especially at a setting of .5 OZ./YR. R-12. Persistent need to readjust the Null Balance Con-

trol or seemingly random signals produced at this setting, however, indicate probable presence of a leak rate exceeding .5 OZ./YR., and leak probing should be continued after switching to a higher Sensitivity setting. 1, 2, or 5 OZ./YR. Sensitivity Selector Switch setting usually eliminates need for repeated adjustment of Null Balance Control under these circumstances and gives adequate sensitivity to locate the source of leakage.

LEAK PROBING IN CONFINED LOCATIONS

When leak testing systems where the standard Probe Assembly does not permit working close to suspected leak source, or if additional length of Sampling Hose is required; use Bacharach Sampling Probe Adapter (Code 23-0081) and up to 48 inches of Teflon Sampling Tubing as illustrated in the lower portion of Figure 8. Response time will of course be increased with any extra Tubing added, and accordingly, the rate operator

probes for leaks should be reduced. After pinpointing area of suspected leak, allow up to 5 seconds for a signal before moving Teflon Sampling Tubing to another suspect leakage point.

ALWAYS REMOVE SAMPLING PROBE ADAPTER (Code 23-0081) AND REINSTALL PROBE TIP (Code 23-0034) WHEN CHECKING LEAK DETECTOR AS OUTLINED IN CHECKLIST TEST NOS. 5 AND 6.

MAINTENANCE INSTRUCTIONS

NOTE: When contacting factory for spare parts or for questions regarding warranty; refer to serial

number and date stamped on underside of chassis between Battery Holders.

BATTERY RECOMMENDATIONS

When Leak Detector cannot be null balanced, and CHECKLIST TESTS indicate battery replacement is required; replacement with alkaline manganese D-size EVEREADY ENERGIZER CELL No. E95 is recommended. Other brands and types of D-size batteries may be used providing all six batteries are the same. Battery life, of course, will be reduced if carbon zinc batteries are used. If EVEREADY E95 Cells are not available; EVEREADY D99, 950, or RAY-O-VAC 3LP, 2LP batteries may be substituted.*

Model SA63 operates with no limitation on duty cycle, but longer battery life is to be expected

with intermittent operation since batteries recover. Alkaline manganese types are superior in this respect to other dry batteries.

Starting with fresh batteries, it is to be expected that the Pump batteries will need replacement shortly before Trigger Circuit batteries. WE RECOMMEND REPLACEMENT OF ALL SIX (6) BATTERIES AT THE SAME TIME PUMP BATTERIES ARE REPLACED.

** It may be necessary to drain the voltage "edge" from these batteries before instrument can be nulled. Operating Leak Detector for 15 to 20 minutes should be adequate.*

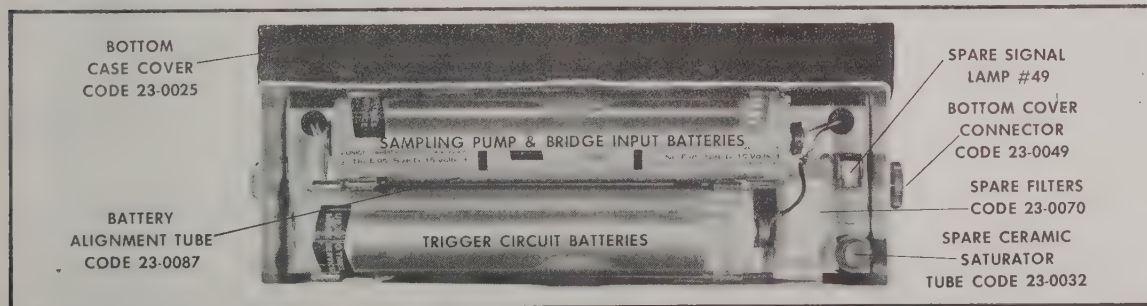


Fig. 7 Bottom View of Chassis Showing Battery Location and Storage Compartments

BATTERY REPLACEMENT

Figure 7 shows two battery clusters, consisting of three batteries each, to power the Pump, Bridge, and Trigger Circuit components.

Access to batteries is obtained by loosening the two Knurled Connectors at the bottom Cover of the Leak Detector.

Swing bottom Cover away from instrument Case and remove batteries by lifting Battery Alignment Tube out of retaining clips. Replace exhausted batteries and reinsert Battery Alignment Tube in

direction of correct polarity. Battery terminals at the end of the Clip Holder Assembly permit insertion of Batteries in the direction of correct polarity only.

POSITIVE BATTERY TERMINAL IS ALWAYS INSERTED INTO THE RED RECEPTACLE ON THE CLIP HOLDER ASSEMBLY. If Leak Detector is to be stored for several weeks or longer remove batteries. Always remove dead batteries immediately.

SIGNAL LAMP REPLACEMENT

Replacement of this Lamp is indicated when audible signal is heard, but no corresponding visual signal is seen.

The Model SA63 Leak Detector is supplied with a spare Signal Lamp clipped to the bottom of the Chassis. Figure 7 shows the location of this spare.

Replace by unscrewing the Signal Lamp Dome Lens from the top of the Control Console. Turn and lift out the old Signal Lamp and insert the replacement.

Signal Lamps are available commercially as Type No. 49. **NO SUBSTITUTES ARE POSSIBLE.**

CERAMIC SATURATOR TUBE WETTING

The metal Probe Insert (Code 23-0089) visible in the Probe Body must be replaced with a wetted ceramic Saturator Tube (Figure 8, Code 23-0032) whenever Leak Detector is used around moist surfaces or when free water is present in air such as outdoors in rain. Figure 7 shows location in

bottom of instrument Chassis of spare Ceramic Saturator Tube. See Spare Parts List for complete Maintenance Kit (Code 23-0092) available optionally.

WARNING: Ceramic Saturator Tube is fragile. Handle this part with care.

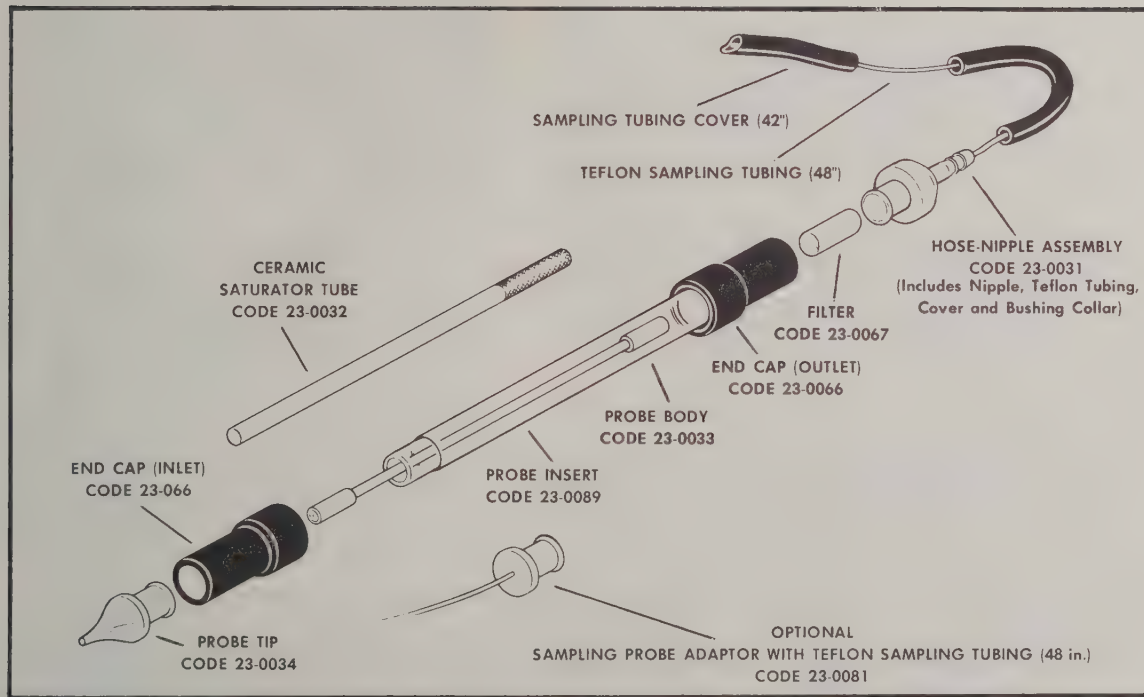


Fig. 8 Probe Assembly

TO REMOVE AND WET SATURATOR:

1. Grip clear plastic Probe Body and with other hand press and twist inlet End Cap until End Cap and Saturator Tube are freed from Probe Assembly (See Figure 9). Remove Saturator Tube from inlet End Cap. Probe Insert is removed in a similar manner.

2. Hold Saturator Tube by RED portion, and wet thoroughly with tap water, taking care to hold red end up.

3. Shake away excess water droplets and blow through RED portion of Saturator Tube to insure passage is clear of water droplets.

4. Insert wetted Saturator Tube into inlet End Cap.

5. Reassemble Probe by carefully reinserting inlet End Cap and Saturator Tube into Probe Body and outlet End Cap. RED portion of Saturator Tube must always be inserted into the outlet End Cap as the paint prevents excess water droplets from entering the Sampling Tubing.

6. Check to see that all connections are fully engaged, then turn Leak Detector on and allow to run for at least one minute. Remove Hose Nipple from outlet End Cap and inspect Filter for dampness.

7. If Filter is dry, Leak Detector is ready for

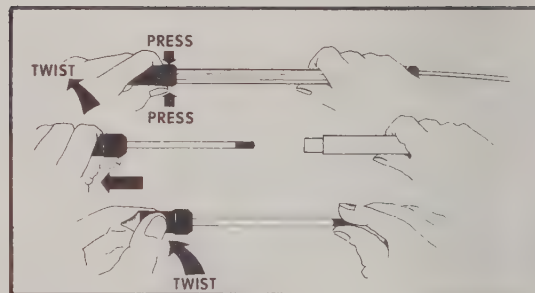


Fig. 9 Saturator Tube Removal

operation on equipment where condensed water vapor is present. IF EVIDENCE OF EXCESSIVE MOISTURE IS FOUND AT FILTER, REPEAT STEPS 3, 4, and 5, REPLACE FILTER, AND REPEAT STEPS 6 and 7.

One such wetting of the Saturator Tube will last in excess of the normal working day even if Leak Detector is operated continuously.

TO REMOVE WATER FROM SAMPLING TUBING

CHECKLIST Test 5 will confirm presence of "slugs" of water in Teflon Sampling Tubing which restrict sample flow to the Thermal Conductivity Cell. Restriction is generally due to failure to use Ceramic Saturator Tube (Code 23-0032) when

leak probing wet surfaces.

To clear restriction, remove Probe Assembly by disconnecting Hose Nipple from outlet End Cap and remove Filter. If Filter is damp, restriction is most likely between the Thermal Conductivity Cell and Filter. Remove Instrument Housing and

FILTER REPLACEMENT

A cylindrically shaped Filter is employed as part of the Probe Assembly to prevent dirt and other foreign matter from entering the Sampling Tubing. This Filter, if Leak Detector is used around dirt and oil encrusted equipment, will eventually re-

disconnect Teflon Sampling Tubing from Cell. Blow Teflon Tubing out until restriction is removed.

Insert new Filter and perform CHECKLIST Test 5 again. If wet surfaces are to be probed; insert Ceramic Saturator Tube as described in preceding section.

duce the sample flow rate (Checklist Test No. 5) and require replacement. Replace with Bacharach Code 23-0067 Filter (Package or 4, Code 23-0070). Remove Hose Nipple from outlet End Cap and replace old Filter.

SATURATOR TUBE REPLACEMENT

Reduced flow rate observed when performing Checklist Test No. 5 may also be the result of a clogged or dirty Saturator Tube. Spare Ceramic Saturator Tubes may be obtained as a part of the Maintenance Kit (Code 23-0092) offered optionally.

Refer to Figure 9 for correct method of removing Saturator Tube. Hold Tube by red portion as often as possible. This will prevent dirt from reducing Saturator Tube wetting efficiency.

NEED FOR COARSE NULL ADJUSTMENT

CHECKLIST Test 4 will indicate need for readjustment of Coarse Null. IT IS IMPORTANT TO CONDUCT THIS TEST WITH FRESH BATTERIES INSTALLED TO AVOID NEEDLESS AND UNWARRANTED READJUSTMENT OF

COARSE NULL DUE TO LOW BATTERY VOLTAGE. Other causes of temporary inability to null balance such as elevated ambient temperature and insufficient warmup period should not be confused with the need to readjust the Coarse Null.

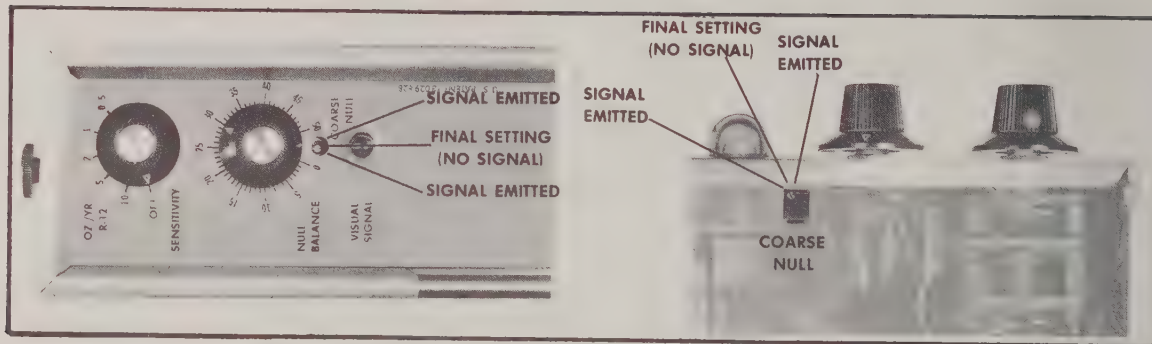


Fig. 10a & 10b Adjusting Coarse Null Potentiometer (All Models)

With above conditions met, need for Coarse Null adjustment will be indicated when instrument cannot be nulled, or null point is less than 1 division wide and appears between 0 and 10 or 40 and 50 on the Null Balance Control scale with Selector Switch set to .5 OZ./YR.

ADJUSTING COARSE NULL POTENTIOMETER (ALL MODELS)

1. Leave fresh batteries in Leak Detector and turn Sensitivity Selector Switch to 10 OZ./YR. R-12. Audible Signal Switch may be turned off until Step 6 if desired. Allow 10 minutes warmup.
2. Rotate Null Balance Control to setting of 25.
3. Insert screwdriver in console opening marked

Properly adjusting the Coarse Null Potentiometer will alter the Leak Detector electronic balancing network so that balance can again be effected by the Null Balance Control between approximately 20 and 30.

COARSE NULL (Fig. 10a), and turn potentiometer all the way in or out. End of potentiometer adjustment at either extreme is evidenced by slight increase in force required to turn adjusting screw, followed by a "click". Potentiometer has 25 complete turns end to end.

NOTE: Fig. 10b shows location of Coarse Null Potentiometer within Chassis of less recent SA63 Leak Detectors. Coarse Null is adjusted in exactly same manner as illustrated for instruments with Coarse Null located on console (Fig. 10a).

4. Turn Coarse Null Potentiometer slowly in opposite direction (away from end of pot) until Leak Detector nulls (no signal emitted).

5. Purpose of Coarse Null adjustment is to bring fine null (Null Balance Knob) to a point where null setting appears between 20 and 30. Careful adjustment of the Coarse Null is necessary to do this.

After finding null in Step 4, produce unbalanced condition by turning Coarse Null Potentiometer first in one direction, then the other, until a signal is obtained at each extreme. Note position

of screwdriver slot at each extreme of null, and set Potentiometer to center of extremes (See Fig. 10a).

6. Recheck accuracy of Coarse Null adjustment just accomplished by turning Sensitivity Selector Switch to .5 OZ./YR. and null instrument with the Null Balance Control. Null point should fall between 20 and 30. Additional minor adjustments described in Step 5 and shown in Figure 10 may be necessary to adjust null to fall between 20 and 30.

NOTE: If attempts to adjust Coarse Null fail, and Leak Detector still will not null, or null is adjusted to fall between 20 and 30, but .5 OZ./YR. setting still will not null; return instrument to factory for repair.

ADJUSTING FLOW SCREW

Sampling Pump is factory adjusted to draw 50 cc./min. which corresponds to a 3 second response time when checking flow rate on exhaled breath as described in CHECKLIST TEST 5.

Flow should always correspond to factory set value since low flow will increase signal response time, and high flow will result in loss of sensitivity.

If fresh batteries have been installed, and there is no Flow System restriction or leakage, CHECK-

LIST Test 5 will indicate that Flow Screw should be adjusted.

Figure 11 shows the location of the Flow Screw on the Pulsation Dampener Assembly.

Turn Flow Screw counter-clockwise to increase flow (decrease response time), and clockwise to decrease flow (increase response time). Flow Screw should be adjusted in small increments until flow corresponds to 50cc./min. or a 3 second signal

response when breath is puffed into Probe Tip.

CHECKING FOR FLOW SYSTEM LEAKAGE

If after performing CHECKLIST Tests 1 through 5, testing fails to uncover need for replacement of batteries or restriction in flow system due to clogged Probe Tip, Filters, etc.; examine Probe, Sampling Hose Assembly, and Conductivity Cell connections for leakage as follows:

(a) Make certain Probe Assembly is leak tight by checking Probe Tip, inlet and outlet End Caps, and Hose Nipple for proper engagement.

(b) Visually check Sampling Tubing Cover for breaks or evidence of scuffing. The black neoprene Cover serves to protect the Teflon Sampling Tubing and evidence of wear may be a clue to leakage.

(c) Refer to Fig. 8 for details of sampling hose construction. Pry Cover from barbed Hose Nipple and note whether Teflon Sampling Tubing forms a snug fit. Care must be taken when removing the outer Cover for inspection, not to loosen the Teflon Sampling Tubing which is also fitted to the Hose Nipple.

(d) Remove Housing from Chassis (Figure 11) and examine all Thermal Conductivity Cell, Dampening Chamber, and Sampling Pump connections for

evidence of deterioration and leakage.

NOTE: If there is doubt whether leakage exists at a certain point in the Flow System; the following test should be conducted.

1. Turn Sensitivity Switch to .5 OZ./YR. and allow instrument to warmup for 10 minutes.

2. Seal off Probe Tip with finger and null Leak Detector with Null Balance Control. Keep Probe Tip sealed during remainder of test.

3. Puff exhaled breath over likely Flow System leakage points. Take care not to heat Thermal Conductivity Cell with prolonged puffing as this may cause false signal.

4. If leak in system exists, Leak Detector will signal when exhaled breath leaks into system. If signal occurs, repeat test to ascertain exact point of leakage. Make necessary repairs by referring to PARTS LIST for replacement parts required.

After Flow System leak has been located and repaired, the instrument should emit a signal immediately when Probe Tip is sealed off at .5 OZ./YR. R - 12 Sensitivity setting.

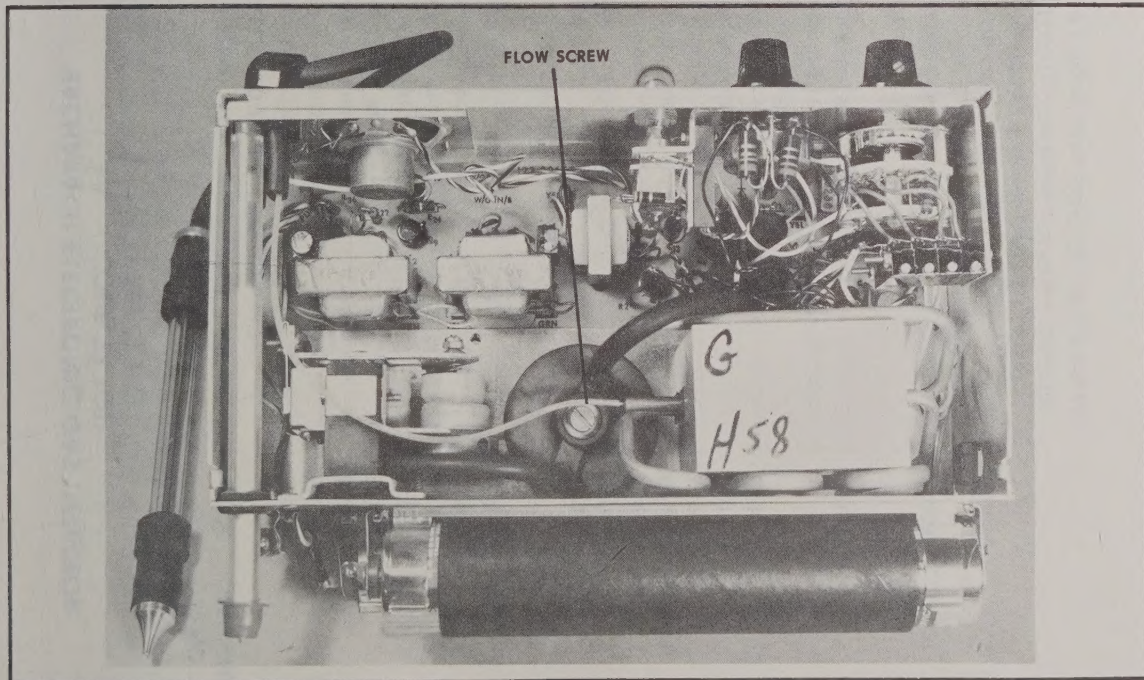


Figure 11. Leak Detector with Case removed showing Flow Screw and Pulsation Dampener.

BACHARACH ELECTRONIC GAS DETECTOR

CODE 23-7001

PARTS LIST

ITEM	CODE	NO. REQUIRED
MISCELLANEOUS (See Figures 2 and 7)		
Signal Lamp Dome Lens	23-0095	1
Battery Alignment Tube	23-0087	2
Carrying Strap	23-0050	1
Case Cover, Bottom or Top	23-0025	2
Bottom Cover Knurled Connector	23-0049	2
Top Cover Knurled Connector	23-0028	2
Batteries, Alkaline, Package of 6	23-0103	1
Signal Lamp	23-0102	1

PROBE ASSEMBLY (See Figure 8)

Probe Tip	23-0034	1
Rubber End Cap, Inlet or Outlet	23-0066	2
Probe Insert	23-0089	1
Ceramic Saturator Tube	23-0032	1
Probe Body	23-0033	1
Filter, Package of 4	23-0070	1
Hose-Nipple Assembly	23-0031	1
Includes Teflon Sampling Tubing,		
Sampling Tubing Cover, and Bushing Collar.		
Strain Relief Bushing	04-0653	1

OPTIONAL

Sampling Probe Adapter	23-0081	1
Includes 48 in. of Teflon Sampling Tubing.		
Leak Detector Maintenance Kit	23-0092	1
Comprising 7 Ceramic Saturator Tubes		
(23-0032); 2 Packages of 4 Filters (23-0070)		
and 1 Signal Lamp (23-0102), all in Parts Box.		



MP MASTER



MA26448

BACHARACH INSTRUMENT COMPANY

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